

REMARKS

Claims 5-32 are pending in the application.

Claims 11, 17, 22 and 29 stand rejected for informalities. Claims 5-31 stand rejected under 35 USC §112, second paragraph, as being indefinite. Claims 5-9, 11-15, 17-22, 25-29 and 32 stand rejected under 35 USC §102(e) as being anticipated by Watanabe et al. (U.S. Patent No. 6,153,898). Claims 10, 16, 23, 24, 30 and 31 stand rejected under 35 USC §103(a) as being unpatentable over Watanabe.

Claims 11, 17, 22 and 29 are amended to correct the informalities listed by the Examiner, and therefore, Applicants request withdrawal the objections to the claims in the next Office Action.

Regarding the §112, second paragraph rejections, the Examiner is respectfully reminded that the definiteness of claim language must be analyzed, not in a vacuum, but in light of: the content of the particular application disclosure; the teachings of the prior art; and the claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made. MPEP §2173.02. MPEP 2173.02 further provides the test the Examiner is to use to determine if a claim is definite under §112, second paragraph as the following: the Examiner must consider the claim as a whole to determine whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 USC §112,

second paragraph. The breadth of a claim is not to be equated with indefiniteness. MPEP §2173.04 citing to *In re Miller*, 441 F.2d, 689, 169 USPQ 597 (CCPA 1971).

Regarding claims 5, 12, 18 and 25, the Examiner states that the limitation “the layer comprising at least one portion” is vague and indefinite because it is unclear what the limits of the “portions” are (Pg. 2 of Paper No. 17). Applicants submit that such language and the scope of such language is clearly understood in the context of exemplary aspects of the inventions disclosed in the originally-filed application.

Referring to page 7, lines 3-16; page 9, lines 4-9; and page 10 of the originally-filed application, an exemplary “the layer comprising at least one portion” and exemplary “portions” are clearly defined. Moreover, an exemplary “the layer comprising at least one portion” and exemplary “portions” are clearly shown in Fig. 2 and referenced, for example, as 35 and 36, respectively. Given such a disclosure, it is inconceivable that one of ordinary skill in the art would not understand the scope of the claim language reciting “the layer comprising at least one portion” and “portions”. Accordingly, the §112 rejections are improper and should be withdrawn. Claims 5, 12, 18 and 25 are definite.

Regarding claims 6 and 19, the Examiner states that the limitations “wherein the another portion” and “of the another of the metals” are vague, indefinite and confusing language. Applicants submit the language is clearly understood in the

context of exemplary aspects of the inventions disclosed in the originally-filed application.

Referring to page 8, lines 1-18 of the originally-filed application, an exemplary “wherein the another portion” and an exemplary “of the another of the metals” are clearly defined. Moreover, an exemplary “wherein the another portion” is clearly shown in Fig. 2 and referenced, for example, as 38. Given such a disclosure, it is inconceivable that one of ordinary skill in the art would not understand the scope of the claim language reciting “wherein the another portion” and “of the another of the metals”. Accordingly, the §112 rejections are improper and should be withdrawn. Claims 6 and 19 are definite.

Regarding claim 7, the Examiner alleges that the limitation “the one metal” and “the another portion” are vague and indefinite, stating that it is unclear which layers are being referred to. Applicants submit the language is clearly understood in the context of exemplary aspects of the inventions disclosed in the originally-filed application.

Referring to page 7, lines 17-24 of the originally-filed application, an exemplary “the one metal” is clearly defined. An exemplary “the another portion” is clearly taught at page 8, lines 1-18 of the originally-filed application and is clearly shown in Fig. 2 and referenced, for example, as 38. Given such a disclosure, it is inconceivable that one of ordinary skill in the art would not understand the scope of the claim language limitation “the one metal” and “the

another portion". Accordingly, the §112 rejection is improper and should be withdrawn. Claim 7 is definite.

Regarding claim 8, Examiner states that the limitation "the at least one portion" is confusing language and "the one electrode" is indefinite, not specifying which electrode. Applicants submit the language is clearly understood in the context of exemplary aspects of the inventions disclosed in the originally-filed application.

Referring to page 7, lines 3-16; page 9, lines 4-9; and page 10 of the originally-filed application, an exemplary "the at least one portion" is clearly defined. An exemplary "the one electrode" is clearly taught at page 6, lines 5-14 of the originally-filed application and is clearly shown in Fig. 2 and referenced, for example, as 24 and referenced, for example, as 26. Given such a disclosure, it is inconceivable that one of ordinary skill in the art would not understand the scope of the claim language limitation "the at least one portion" and "the one electrode". Accordingly, the §112 rejection is improper and should be withdrawn. Claim 8 is definite.

Regarding claims 9, 13, 15, 21, 26 and 28, the Examiner states that the limitations regarding the "portions" are vague and indefinite as it is unclear if the "portions" are layers or portions of layers. Respectfully, Applicants submit that the language is clearly understood in the context the rest of the language of each claim, that is, "wherein the layer comprises portions". Such answers the

Examiner's question. The language identified in the Office greater than the first current leakage potential (i.e., whether "portions" are layers or portions of layers) is not being explicitly claimed. Moreover, the language is clearly understood in the context of exemplary aspects of the inventions disclosed in the originally-filed application.

The respective independent claims from which these dependent claims depend each recite "the layer comprising at least one portion". Referring to page 7, lines 3-16; page 9, lines 4-9; and page 10 of the originally-filed application, an exemplary "the layer comprising at least one portion" is clearly defined. Additionally, an exemplary "the layer comprising at least one portion" is clearly shown in Fig. 2 and referenced, for example, as 35. Given such a disclosure, it is inconceivable that one of ordinary skill in the art would not understand the scope of the claim language reciting "portions". Accordingly, the §112 rejections are improper and should be withdrawn. Claims 9, 13, 15, 21, 26 and 28 are definite.

Regarding claim 12, the Examiner states the limitation "absence of the one metal in the oxide" is unclear. Applicants submit the language is clearly understood in the context of exemplary aspects of the inventions disclosed in the originally-filed application.

Referring to page 8, lines 19-24 to page 9, lines 1-8 of the originally-filed application, an exemplary "absence of the one metal in the oxide" is clearly

defined. Given such a disclosure, it is inconceivable that one of ordinary skill in the art would not understand the scope of the claim language limitation "absence of the one metal in the oxide". Accordingly, the §112 rejection is improper and should be withdrawn. Claim 12 is definite.

Regarding claim 20, the Examiner states that multiple references to "the another" are vague and indefinite. Applicants submit the language is clearly understood in the context of exemplary aspects of the inventions disclosed in the originally-filed application.

Referring to independent claim 18 from which dependent claim 20 depends, "the another" is clearly defined as "another of the metals when bonded with oxygen." Referring to page 8, lines 1-18 of the originally-filed application, an exemplary another of the metals bonded with oxygen is clearly defined. Given such a disclosure, it is inconceivable that one of ordinary skill in the art would not understand the scope of the claim language limitation "the another" which is clearly defined in independent claim 18 as "another of the metals when bonded with oxygen" from which claim 20 depends. Accordingly, the §112 rejection is improper and should be withdrawn. Claim 20 is definite.

Regarding claim 27, the Examiner states the language "the another portion" is confusing language. Applicants submit the language is clearly understood in the context of exemplary aspects of the inventions disclosed in the originally-filed application.

Referring to page 8, lines 1-18 of the originally-filed application, an exemplary "the another portion" is clearly defined. Moreover, an exemplary "the another portion" is clearly shown in Fig. 2 and referenced, for example, as 38. Given such a disclosure, it is inconceivable that one of ordinary skill in the art would not understand the scope of the claim language reciting "the another portion". Accordingly, the §112 rejections are improper and should be withdrawn. Claim 27 is definite.

Regarding the §102 rejections, claim 5 recites one of the metals when bonded with oxygen having a first current leakage potential, another of the metals when bonded with oxygen having a second current leakage potential which is *greater than the first current leakage potential*. The Office greater than the first current leakage potential mailed November 11, 2001 does not point to a specific teaching of this limitation (pg. 3 of paper no. 17). The Office greater than the first current leakage potential refers to Fig. 1 and col. 4, lines 10-17, 24-26, and 37-39 of Watanabe to suggest teaching of the limitations of claim 5 (pgs. 3-4 of paper no. 17). Applicants disagree.

The disclosure of Watanabe is completely devoid of any teaching or suggestion to greater than the first current leakage potential. An electronic search of the reference verifies the same. The sections of Watanabe referenced by the Office Action state, respectively:

The oxide of the layered crystal structure is made up of bismuth, a first element, a second element and oxygen. The first element is at

least one selected from the group consisting of strontium, calcium and barium. The second element is at least one selected from the group consisting of tantalum and niobium. Strontium is most preferable for the first element so as to achieve particularly excellent ferroelectric properties (Col. 4, Ins. 10-17). . .

In terms of stoichiometrical composition, the crystal structure of the oxide is made up of layers of $[\text{Bi}_2\text{O}_2]^{2+}$ and layer of $[(\text{Sr}, \text{Ca}, \text{Ba})_1(\text{Ta}, \text{Nb})_2\text{O}_7]^{2-}$ alternately stacked (Col. 4, Ins. 24-26). . .

The variation in proportion of the first element is provided for both maintaining excellent ferroelectricity and reducing the crystal grain size of the oxide (Col. 4, Ins. 37-39).

These quotes do not teach or suggest the limitation of greater than the first current leakage potential. Applicants have repeatedly stated in previous Office Action Responses that such limitation is not taught by Watanabe (see for example, pg. 6 of Applicant's Office Action Response dated February 19, 2001; pgs. 9-11 of Applicant's Office Action Response dated September 5, 2001). No other prior art has been identified which allegedly discloses or suggests the limitation of greater than the first current leakage potential. Since the Examiner has never presented any specific teachings to such limitation, the rejections can only be based upon personal knowledge of the Examiner.

Respectfully, the Examiner is reminded that 37 CFR §1.104(c)(2) states that "In rejecting claims for want of novelty or for obviousness, the examiner must cite the best references at his or her command. . . a particular part [of a reference] relied upon must be designated as nearly as practical. The pertinence of each reference, if not apparent, must be clearly explained in each rejected claim

specified." "[A]ssertions of technical facts in areas of esoteric technology **must always** be supported by citation of some reference work" and "allegations concerning specific 'knowledge' of the prior art, which might be peculiar to a particular art should also be supported." *In re Ahlert*, 424 F.2d 1088, 165 USPQ 418, 420-421 (CCPA 1970) (emphasis added). 37 CFR §1.104(d)(2) states when *a rejection in an application is based on facts within the personal knowledge of an employee of the Office, the rejection must be supported by an affidavit when called for by the Applicant*. Since the Examiner has never presented any specific teachings of greater than the first current leakage potential, such teaching to such limitation can only be based upon personal knowledge of the Examiner. Consequently, pursuant to the above authority, Applicants respectfully request that the Examiner submit prior art which allegedly discloses the limitations of claim 5, or an affidavit attesting to the Examiner's knowledge. Claim 5 is allowable.

Claims 6-11 depend from independent claim 5, and therefore, are allowable for the reasons discussed above with respect to the independent claim, as well as for their own recited features which are neither shown or taught by the art of record.

Claim 12 recites one of the metals when bonded with oxygen producing a first material having a first current leakage potential, absence of the one metal in the oxide creating a vacancy and a second material having a second current

leakage potential which is greater than the first current leakage potential. Claim 12 recites allowable subject matter.

Similar to the arguments above with respect to independent claim 5, Watanabe does not teach or suggest greater than the first current leakage potential. Applicants have repeatedly stated that such limitation is not taught in previous Office Actions (see for example, pg. 6 of applicant's Office Action Response dated February 19, 2001; pgs. 9-11 of applicant's Office Action Response dated September 5, 2001). Since no reference has been presented which allegedly teaches or suggests such limitation, the Examiner must be stating facts which are within the Examiner's own knowledge. Given such, pursuant to the above authority, Applicants respectfully request an affidavit in support of the rejection of claim 12. Applicant respectfully requests allowance of claim 12 in the next Office Action.

Claims 13-17 depend from independent claim 12, and therefore, are allowable for the reasons discussed above with respect to the independent claim, as well as for their own recited features which are neither shown or suggested by the art of record.

Claim 18 recites one of the metals when bonded with oxygen having a first dielectric constant, another of the metals when bonded with oxygen having a second dielectric constant which is less than the first dielectric constant. The Office greater than the first current leakage potential mailed November 11, 2001

does not point to a specific teaching of this limitation (pg. 5 of paper no. 17). The Office greater than the first current leakage potential refers to Fig. 1 and col. 4, lines 10-17, and lines 24-26 of Watanabe to suggest teaching of the limitations of claim 18 (pgs. 5 of paper no. 17). Applicants disagree.

The disclosure of Watanabe is completely devoid of any teaching or suggestion to a dielectric constant, much less a second dielectric constant which is less than the first dielectric constant as recited in claim 18. An electronic search of the reference verifies the same. The sections of Watanabe referenced by the Office Action state, respectively:

The oxide of the layered crystal structure is made up of bismuth, a first element, a second element and oxygen. The first element is at least one selected from the group consisting of strontium, calcium and barium. The second element is at least one selected from the group consisting of tantalum and niobium. Strontium is most preferable for the first element so as to achieve particularly excellent ferroelectric properties (Col. 4, Ins. 10-17). . .

In terms of stoichiometrical composition, the crystal structure of the oxide is made up of layers of $[\text{Bi}_2\text{O}_2]^{2+}$ and layer of $[(\text{Sr}, \text{Ca}, \text{Ba})_1(\text{Ta}, \text{Nb})_2\text{O}_7]^{2-}$ alternately stacked (Col. 4, Ins. 24-26). . .

These quotes do not teach or suggest the limitation of a second dielectric constant which is less than the first dielectric constant. No other prior art has been submitted to disclose a second dielectric constant which is less than the first dielectric constant. Since the Examiner has not presented any specific teachings of a second dielectric constant which is less than the first dielectric constant, the rejection can only be based upon personal knowledge of the Examiner.

Consequently, pursuant to the above authority presented regarding claim 5, Applicants respectfully request that the Examiner submit prior art which discloses the limitations of claim 18, or an affidavit attesting to the knowledge of the Examiner. Applicant respectfully requests allowance of claim 18 in the next Office Action.

Claims 19-24 depend from independent claim 18, and therefore, are allowable for the reasons discussed above with respect to the independent claim, as well as for their own recited features which are neither shown or suggested by the art of record.

Claim 25 recites one of the metals when bonded with oxygen producing a first material having a first dielectric constant, absence of the one metal in the oxide creating a vacancy and a second metal having a second dielectric constant which is less than the first dielectric constant. Claim 25 recites allowable subject matter.

Similar to the arguments above with respect to independent claim 18, Watanabe does not teach or suggest a second dielectric constant which is less than the first dielectric constant. Since no reference has been presented to teach such limitation, the Examiner relies upon their own knowledge in formulating the rejection. Given such, and pursuant to the above authority, Applicants respectfully request that the Examiner submit prior art which discloses the limitations of claim

25, or an affidavit attesting to the knowledge of the Examiner. Applicant respectfully requests allowance of claim 25 in the next Office Action.

Claims 26-31 depend from independent claim 25, and therefore, are allowable for the reasons discussed above with respect to the independent claim, as well as for their own recited features which are neither shown or taught by the art of record.

Claim 32 recites wherein the electrodes comprise material of at least one of conductively doped polysilicon, conductively doped hemispherical grain polysilicon, tungsten, tungsten nitride, tantalum nitride, titanium nitride and titanium oxygen nitride. Claim 32 recites patentable subject matter.

Watanabe teaches the electrodes "are each made of a material selected from the group consisting of platinum (Pt), iridium (Ir), ruthenium (Ru), rhodium (Rh) and palladium (Pd) or an alloy of two or more selected from the group" (col. 3, lines 60-65). In no reasonable interpretation could Watanabe teach or suggest the electrodes comprise material of at least one of conductively doped polysilicon, conductively doped hemispherical grain polysilicon, tungsten, tungsten nitride, tantalum nitride, titanium nitride and titanium oxygen nitride as recited in claim 32. Accordingly, Watanabe fails to teach a positively recited limitation of claim 32, and therefore, claim 32 is allowable.


This application is now believed to be in immediate condition for allowance, and action to that end is respectfully requested. If the Examiner's next anticipated

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action is to be anything other than a Notice of Allowance, the undersigned respectfully requests a telephone interview prior to issuance of any such subsequent action.

Respectfully submitted,

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application Serial No. 09/388,063
Filing Date August 30, 1999
Inventor Vishnu K. Agarwal
Assignee Micron Technology, Inc.
Group Art Unit 2815
Examiner J. Fenty
Attorney's Docket No. MI22-1196
Title: Capacitors Having a Capacitor Dielectric Layer Comprising a Metal Oxide Having
Multiple Different Metals Bonded With Oxygen

VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING
RESPONSE TO NOVEMBER 29, 2001 OFFICE ACTION

In the Claims

The claims have been amended as follows. Underlines indicate
insertions and ~~strikeouts~~ indicate deletions.

11. (Amended) The capacitor of claim 5 wherein the capacitor dielectric
region consists essentially of the layer.

17. (Amended) The capacitor of claim 12 wherein the capacitor
dielectric region consists essentially of the layer.

22. (Amended) The capacitor of claim 18 wherein the capacitor
dielectric region consists essentially of the layer.

29. (Amended) The capacitor of claim 25 wherein the capacitor dielectric region consists essentially of the layer.

32. (Amended) A capacitor comprising first and second conductive electrodes having a high k charge storage dielectric region positioned therebetween, the high k charge storage dielectric region comprising a layer of metal oxide having multiple different metals bonded with oxygen, the layer having varying stoichiometry across its thickness, the layer comprising an inner region, a middle region, and an outer region, the middle region having a different stoichiometry than both the inner and outer regions, wherein the electrodes comprise material of at least one of conductively doped polysilicon, conductively doped hemispherical grain polysilicon, tungsten, tungsten nitride, tantalum nitride, titanium nitride and titanium oxygen nitride.

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